Measuring Sediment Flux at a Mars Analog Site Using Multilayer Solid-State Saltation Sensors.

Completed Technology Project (2016 - 2019)

Project Introduction

Description of the science goals and objectives: This proposal will determine the utility of using multi-layer solid-state saltation sensors (e.g. SENSIT(tm) Saltation Sensor) to measure sediment flux at a Mars analog site in lieu of sediment collectors. We will use previously funded sediment collectors (BSNEs) and anemometers to calibrate the sediment flux from the multi-layer solid-state saltation sensors (MLS4) as a function of kinetic energy and particle counts. In addition to measuring sediment flux, we will characterize the thermal stability of the boundary layer by using a series of temperature sensors mounted on a pole. Instabilities within the boundary layer may cause changes to the vertical distribution of the sediment flux. Brief description of the methodology: This proposal will augment a previously (and ongoing) Mars analog study site with two additional pieces of instrumentation: (1) MLS4 and (2) a set of multi-layer temperature sensors. We plan to extend the collection of field data from the previously funded instrumentation (sediment collectors and anemometers) to calibrate an algorithm to convert the MLS4 kinetic energy and particle count rates into sediment flux. We will monitor the atmospheric temperature profile to determine if thermal instabilities affect this calibration algorithm. Relevance of the proposed research: This proposal is relevant to two of the three areas of fidelity. Science: The Grand Falls dune field site is a local area (40 miles from the PI's institution) with high winds, active dunes and a range of precipitation and temperatures. This proposal will continue the collection of an additional year of sediment flux measurements. This additional year of data will allow for the analysis of interannual variability. The additional instrumentation to measure the near-surface atmosphere temperature profile will help determine the air stability and compare that to sediment flux rates. Technology: This proposal will test the deployment, feasibility, and calibration of MLS4 as an instrument package to measure sediment flux rates with no moving parts. We will develop the necessary protocols and procedures that will be needed to calibrate the data under conditions when concurrent sediment collectors and wind observations are not available. This instrument package could either be deployed to Mars (or perhaps Titan) on a rover (e.g. as part of the mast) or as a lander.

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Table of Contents

Organizational Responsibility

Responsible Mission Directorate:

Science Mission Directorate (SMD)

Responsible Program:

Planetary Science and Technology Through Analog Research

Measuring Sediment Flux at a Mars Analog Site Using Multilayer Solid-State Saltation Sensors.

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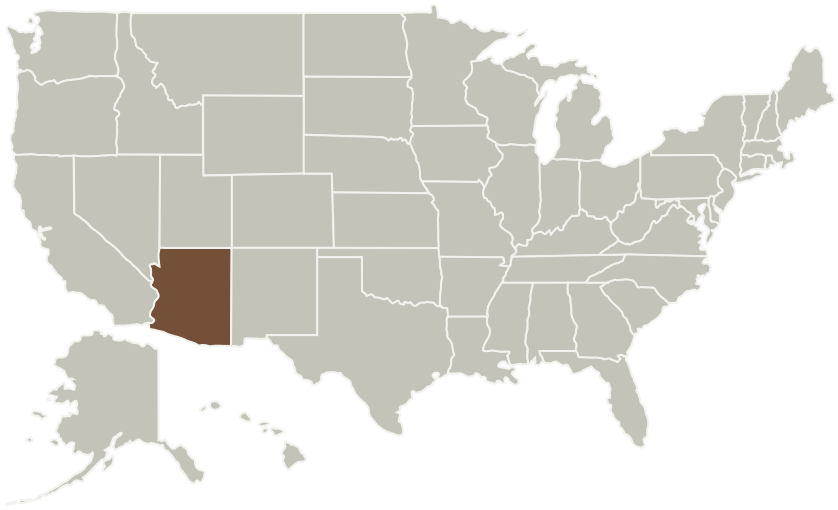
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
United States Geological Survey(USGS)	Supporting Organization	US Government	Menlo Park, California

Primary U.S. Work Locations
Arizona

Project Management

Program Director:

Carolyn R Mercer

Program Manager:

Sarah K Noble

Principal Investigator:

Rosalyn K Hayward

Co-Investigators:

Timothy N Titus
Laszlo Kestay
Rian Bogle

Technology Areas

Primary:

- TX14 Thermal Management Systems
  - TX14.3 Thermal Protection Components and Systems
    - TX14.3.5 Thermal Protection System Instrumentation

Target Destination

Others Inside the Solar System